

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 92-016

WASTE DISCHARGE REQUIREMENTS FOR ISSUANCE OF NPDES NO. CA0029858:

ADVANCED MICRO DEVICES, INC.
901/902 THOMPSON PLACE
SUNNYVALE
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter called the Board) finds that:

1. Advanced Micro Devices (AMD), hereinafter called the discharger, by application received November 14, 1991, has applied for the issuance of a permit to discharge to surface waters under the National Pollutant Discharge Elimination System (NPDES).
2. AMD operates a printed circuit manufacturing plant in two large low rise buildings at 901 and 902 Thompson Place (AMD 901;AMD 902), Sunnyvale, Santa Clara County in an area bounded by the Bayshore, Central, and Lawrence Expressways and Fair Oaks Avenue (see Figure 1). AMD 901 was used as a semiconductor manufacturing facility from 1969 to the 1991. Manufacturing operations at AMD 902 began in 1972 and ceased in December 1991. The manufacturing process at these two facilities involved the use of solvents for cleaning and degreasing, acids for etching, caustics for acid neutralization and some arsine and chromium in the manufacturing process.
3. The discharger has been treating approximately 34,000 gallons per day (gpd) of extracted groundwater as part of a Board approved remedial action program. The water has been reused in facility operations and is discharged to the sanitary sewer, after use, along with other process waste water. Manufacturing operations at the plant ceased in December 1991 and plant closure activities will be completed in early 1992. This will preclude further discharge to the sanitary sewer as process water.

The application submitted by the discharger proposes to discharge about 34,000 gpd of extracted, treated groundwater. The volume of groundwater discharge is based on the average volume treated in the first quarter of 1991. The proposed waste stream will be the same as that generated under the past reuse operations. This is groundwater produced by four

extraction wells and two dewatering sumps with treatment by a packed column air-stripping tower to remove the volatile organics, prior to discharge (see Figure 2). The proposed point of discharge is a City of Sunnyvale storm drain, tributary to Calabazas Creek, and South San Francisco Bay.

4. Initial investigation at the AMD 901/902 site began in 1982 with the investigation of leakage from an acid neutralization system near AMD 901. This leakage was investigated and the acid neutralization system was removed during 1983. In 1984 the investigation expanded to include the acid neutralization system at AMD 902. Polluted soils were found near both acid neutralization systems.

The polluted soils were identified as point sources that had resulted in groundwater pollution with volatile organic chemicals (VOCs). Further investigation and interim remedial actions followed the soils investigation.

Remediation of the groundwater began in 1984 with the installation of two dewatering sumps and one extraction well to contain the onsite pollution. One sump extracts water from the shallow (A) aquifer; the other two systems extract water from the B1 aquifer. Three additional extraction wells were installed in 1988 to enhance the containment of the onsite groundwater pollution plume and to begin containment of the groundwater pollution in the B2 aquifer. The extracted groundwater has been treated and reused as process water at the AMD 901/902 facility.

5. The acid neutralization system and surrounding accessible soil was removed from north of AMD 901 in 1982 and from the south side of AMD 902 in 1984. Extraction wells and a treatment system were installed to cleanup the groundwater and prevent the further migration of groundwater pollutants. Groundwater extraction as a remedial actions has been continuous since 1984.

The remedial actions have resulted in the reduction in the total volatile organic compounds (VOC's) in groundwater monitor wells from initial maximum levels of up to 1000 parts per million (ppm) total VOC's to current maximum levels of about 3 ppm total VOC's. VOC's commonly detected in monitor wells include, 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethylene (1,1-DCE), tetrachloroethylene (PCE), and trichloroethylene (TCE).

TCE has historically been the VOC most commonly detected in groundwater at this site. Initial maximum levels of TCE were as high as 100 ppm. Current maximum levels of TCE in groundwater monitor wells are about 1 ppm. TCE is the only chemical reportedly detected in the treatment system effluent. This detection is at levels below drinking water standards as proposed in this Order.

6. Typically, regulation of pollutants in NPDES permits for discharge of treated groundwater to surface waters has focused on substances present in the groundwater due to the contamination incident(s) subject to cleanup. However, available data indicate that concentrations of inorganics in treated groundwater often exceed the shallow water effluent limitations. In many cases, the presence of inorganics in groundwater is due to natural factors related to soil and water chemistry, rather than contamination. The need to minimize the potential for aquatic toxicity due to elevated levels of inorganics must be balanced against the total mass loading from these discharges, the cost of treatment, and naturally occurring discharge of groundwater with equally high concentrations of inorganics.
7. Due to considerations in Finding Number 6, above, the Inland Surface Waters and Enclosed Bays and Estuaries Plans allow for short-term variances from Basin Plan provisions, if necessary, for discharges resulting from control measures to protect drinking water supplies and where natural background concentrations are typically greater than shallow water effluent limits. The variances will take the form of alternate effluent limitations. Therefore, the discharger will be required to determine background groundwater inorganics concentrations in the vicinity of the AMD 901/902 site. Based on the results of that study, the discharger will be required to meet one of the effluent limitations in Table 2 by March 31, 1993, or if the natural background concentrations are greater than the shallow water freshwater effluent limits, the Regional Board may consider granting a short-term variance to the discharger, and alternate limits will be developed.
8. The discharger, as part of the permit application package, has evaluated the three potential discharge options. The options evaluated include; 1) reclamation, 2) discharge to the POTW, and 3) discharge under the control of an NPDES permit.

The discharger has been reusing the treated effluent and indirectly discharging the treated groundwater to the sanitary sewer system. Manufacturing operations at the facility ceased in December 1991, therefore this discharge option is no longer viable or legal. Offsite reclamation is limited by the lack of a distribution network to move the water from the site. Truck access is limited by the physical size of the site and site security. The small volume of water available further limits the economic feasibility of offsite reclamation of the water.

No significant amount of landscaping exists nearby the treatment system. Parks and public areas nearby are irrigated with reclaimed water from the Sunnyvale treatment plant. Therefore potential for cost effective irrigation use is limited.

Based on this review the discharger has proposed that the only

reliable solution, under current conditions, is discharge to surface waters under the control of an NPDES Permit. In the interest of efficiency and groundwater conservation, groundwater extraction has been reduced to the minimum that will provide containment of the contaminant plume.

9. The Regional Board adopted a revised Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) on December 17, 1986 and adopted amendments on December 11, 1991. The Basin Plan contains water quality objectives for South San Francisco Bay, and contiguous surface and groundwater.
10. The existing and potential beneficial uses of the surface water adjacent to and contiguous with Calabazas Creek, Guadalupe Slough, and South San Francisco Bay include:
 - a. Contact and non-contact water recreation
 - b. Wildlife habitat
 - c. Preservation of rare and endangered species
 - d. Estuarine habitat
 - e. Fish spawning and migration
 - f. Industrial service supply
 - g. Shellfishing
 - h. Navigation
 - i. Ocean commercial and sport fishing
11. The Basin Plan prohibits discharge of wastewater which has "particular characteristics of concern to beneficial uses" (a) "at any point in San Francisco Bay south of the Dumbarton Bridge" and (b) "at any point where the wastewater does not receive a minimum initial dilution of at least 10:1 or into any nontidal water, deadend slough, similar confined water, or any immediate tributary thereof."
12. The Water Quality Control Plan for the San Francisco Bay Region (Basin Plan), adopted by the Regional Board on December 11, 1991, the Inland Surface Waters and Enclosed Bays and Estuaries Plans provide a waiver to the prohibitions referred to in Finding 11 above, when it is part of a groundwater cleanup project, is in accordance with Resolution 88-160, and certification of adequacy and reliability of treatment is provided along with an acceptable operation and maintenance plan.
13. Exceptions to the prohibitions referred to in Finding 11 are warranted for this discharge because the discharge is an integral part of a program to cleanup polluted groundwater, as discussed in Finding 3, is in accord with Resolution 88-160, as discussed in finding 8, includes a requirement for an operation and maintenance plan, and has provided reliable treatment for over seven years. Discharge of waste is a privilege, not a right. Authorization to discharge is conditional upon the discharge complying with provisions of Division 7 of the California Water Code and any more stringent

effluent limitations necessary to implement water quality control plans, to protect beneficial uses, and to prevent nuisance. Compliance with this Order should assure this and limit any potential adverse changes in water quality due to the discharge. Should studies indicate chronic effects, not currently anticipated, the Board will review the requirements of this Order based upon section B.1.e.

14. The basin Plan prohibits discharge of "all conservative toxic and deleterious substances, above those levels which can be achieved by a program acceptable to the Board, to waters of the Basin." The discharger's groundwater extraction and treatment system and associated operation, maintenance, and monitoring plan constitutes an acceptable control program for minimizing the discharge of toxicants to waters of the State.
15. Effluent limitations of this Order (as shown in Tables 1 & 2 below) are based on the Basin Plan, State and U.S. Environmental Protection Agency (EPA) plans and policies, best available treatment economically available (BATEA), and best technical judgement. Also considered in the determination of effluent limits were the EPA Region IX draft guidance "NPDES Permit Limitations for Discharge of Contaminated Groundwater: Guidance Document", and the San Francisco Bay Regional Water Quality Control Board Internal Memorandum dated February 16, 1990, "Proposed NPDES Permit Limits For Common Organic Pollutants Found at Service Stations and Other Groundwater Cleanup Sites."
16. The issuance of waste discharge requirements for the discharge is exempt from the provisions of Chapter 3 (commencing with Section 21100) of Division 13 of the Public Resources Code (CEQA) pursuant to Section 13389 of the California Water Code.
17. The Board has notified the dischargers and interested agencies and persons of its intent, under the provisions of Division 7 of the California Water Code Section, to prescribe Waste Discharge Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
18. This action is an order to enforce the laws and regulations administered by the Regional Board. This action is categorically exempt from the provisions of CEQA pursuant to Section 15321 of the Resources Agency Guidelines.
19. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that the discharger, its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. EFFLUENT LIMITATIONS

1. The discharge of waste containing constituents in excess of the following limits is prohibited:

TABLE 1

Constituent	Instantaneous Maximum Limit (µg/l)
<u>VOC's</u>	
1,1,1-Trichloroethane	5.0
Trichloroethylene	5.0
1,1 Dichloroethylene	5.0
1,2-Dichloroethane	0.5
Vinyl Chloride	0.5
cis-1,2-Dichloroethylene	5.0
trans-1,2-Dichloroethylene	5.0
Total VOCs	5.0 ¹

AROMATIC'S

Benzene	1.0
Ethylbenzene	5.0
Dichlorobenzene	5.0
Trichlorobenzene	5.0
Xylenes	5.0
Total Petroleum Hydrocarbons	50.0 ²

TABLE 2 (µg/l)

Shallow Water Effluent Limits		
CONSTITUENT	HUMAN HEALTH 30-day Average	AQUATIC LIFE Daily Average
Arsenic	5	190
Cadmium	10	1.1
Chromium (VI)	50	11
Copper	1000	11.8
Cyanide	NA	5.2
Lead	50	3.2
Mercury	0.01	2.4
Nickel	600	160

¹ Total of 601 analytes

² As Gasoline & Diesel

TABLE 2 ($\mu\text{g}/\text{l}$)

Shallow Water Effluent Limits		
CONSTITUENT	HUMAN HEALTH 30-day Average	AQUATIC LIFE Daily Average
Selenium	10	5
Silver	50	4
Zinc	5000	110

3. The pH of the discharge of waste shall not exceed 8.5 nor be less than 6.5.
4. In any representative set of samples, the discharges shall meet the following limit of quality:

Toxicity: The survival of test fishes in 96-hour static bioassay of the undiluted effluent as discharged shall be a three sample moving median of 90% survival, and a 90 percentile value of not less than 70% survival in a single sample. The bioassay shall be performed according to protocols approved by the U.S. E.P.A. or State Board or published by the American Society for Testing and Materials or American Public Health Association. Two fish species will be tested concurrently. These shall be the most sensitive two species, determined from a single concurrent screening of three species using two of the following three test fish species in parallel tests. The test fish shall be rainbow trout, fathead minnow, or three-spine stickleback.

B. RECEIVING WATER LIMITATIONS

1. The discharge of waste shall not cause the following conditions to exist in waters of the State at any place:
 - a. Floating, suspended, or deposited macroscopic particulate matter or foam;
 - b. Bottom deposits or aquatic growths;
 - c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
 - d. Visible, floating, suspended, or deposited oil or other products of petroleum origin;
 - e. Toxic or other deleterious substances to be present in concentrations or quantities which will cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for

human consumption either at levels created in the receiving waters or as a result of biological concentration.

2. The discharge of waste shall not cause the following limits to be exceeded in waters of the State in any place within one foot of the water surface:
 - a. Dissolved oxygen: 5.0 mg/l minimum. The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation.
 - b. pH: The pH shall not be depressed below 6.5 nor raised above 8.5, nor caused to vary from normal ambient pH levels by more than 0.5 units.
 - c. Un-ionized ammonia: 0.025 mg/l Annual Median (as N)
0.400 mg/l Maximum
3. This discharge shall not cause a violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board as required by the Federal Water Pollution Control Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Federal Water Pollution Control Act or amendments thereto, the Board will revise and modify this Order in accordance with such more stringent standards.

C. PROVISIONS

1. The Discharger shall comply with all sections of this order immediately upon adoption.
 - a. **TASK: PROPOSAL FOR THE DETERMINATION OF BACKGROUND INORGANIC CONCENTRATIONS**

Submit a technical report acceptable to the Executive Officer which contains a proposal to determine the level of naturally occurring inorganics in the groundwater at the site. This study shall include, but need not be limited to, the sampling and analysis in this Self-Monitoring Plan, the location(s) of background groundwater samples to be obtained (sampling to be concurrent with the Self-Monitoring Plan), specification of the analytical methods for inorganic and the expected laboratory detection limits and QA/QC procedures.

COMPLETION DATE: April 30, 1992

b. TASK: BACKGROUND INORGANIC CONCENTRATIONS RESULTS

Submit a technical report acceptable to the Executive Officer which contains the results of the groundwater inorganics study. The report shall include a comparison of background and affected A-level aquifer conditions to the shallow water discharge effluent concentration limits as indicated in Table 2. Should results of the study show that natural background inorganics concentrations cause the effluent to exceed shallow water effluent limits, the discharger shall provide a technical and cost analysis of increased treatment to reduce mass loading of inorganics.

COMPLETION DATE: October 31, 1992

2. The dischargers shall comply with the Self-Monitoring Program as adopted by the Board and as may be amended by the Executive Officer.
3. The discharger shall also notify the Regional Board if the self-monitoring program results indicate, or if any discharge activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit.
4. This Order includes all items of the attached "Standard Provisions and Reporting Requirements" dated December 1986 except A.10, B.2, B.3, C.8, and C.11.
5. Any noncompliance with a requirement of this Order shall be reported as stated in section C.10 of the "Standard Provisions and Reporting Requirements" referred to in C.4. above.
6. This Order expires February 19, 1997 and the discharger must file a report of Waste Discharge in accordance with Title 23, California Administrative Code, not later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements.
7. This Order shall serve as a National Pollutant Discharge Elimination System permit pursuant to Section 402 of the Federal Water Pollution Control Act, or amendments thereto, and shall become effective at the end of ten days from date of hearing provided the Regional Administrator, U. S. Environmental Protection Agency, has no objection.

I, Steven R. Ritchie, Executive Officer do hereby certify the

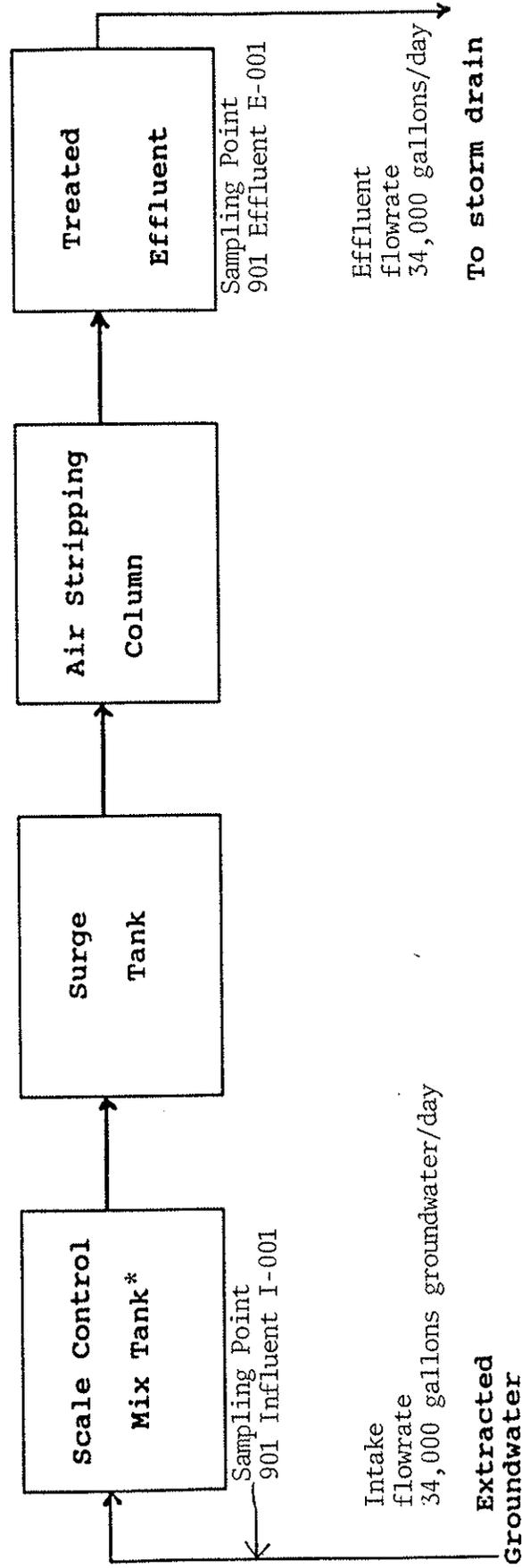
foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region on February 19, 1992.



STEVEN R. RITCHIE
Executive Officer

Attachments: Groundwater Extraction System
Site Map
Standard Provisions and Reporting Requirements -
December 1986
Self-Monitoring Program - December 1986

ADVANCED MICRO DEVICES, INC.
GROUNDWATER TREATMENT SYSTEM
 901 Thompson Place



* Scale control is presently sulfuric acid; this application includes information to change to Pfizer Flocon 100 Antiscalant.

FIGURE 2

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

TENTATIVE

SELF-MONITORING PROGRAM

FOR

ADVANCED MICRO DEVICES, INC.
901/902 THOMPSON PLACE
SUNNYVALE, SANTA CLARA COUNTY

NPDES NO. CA0029858

ORDER NO. 92-016

CONSISTING OF

PART A, dated December 1986 and modified January 1987,
 including Appendices A through E

PART B, Adopted: February 19,1992

PART B

I. DESCRIPTION OF SAMPLING STATIONS

A. INFLUENT

<u>Stations</u>	<u>Description</u>
I-001	At a point in the extraction system immediately prior to inflow to the treatment unit.

B. EFFLUENT

<u>Stations</u>	<u>Description</u>
<u>E-001</u>	At a point in the discharge line immediately following treatment and prior to the effluent reaching the storm drain tributary of Calabazas Creek.
<u>R-001</u>	At a point in the storm drain tributary to Calabazas Creek, still under the control of the discharger and prior to impact from other discharges into the storm drain

II. SCHEDULE OF SAMPLING AND ANALYSIS

A. The schedule of sampling and analysis shall be that given in Table A (attached).

III. MISCELLANEOUS REPORTING

If any chemical additives are proposed to be used in the treatment of extracted groundwater, it shall be reported thirty (30) days prior to their use and documented in the regular quarterly reports.

IV. MODIFICATION TO PART A

A. Deletions:

Sections D.1.a., D.2.a., D.2.f., D.2.g., D.2.h., D.3., E.1.e., E.3., E.4. , and F.2.b.

B. Modifications:

1. D.2.a. Samples of effluent shall be collected at times coincident (same day) with influent sampling unless otherwise stipulated. The Regional Board or Executive Officer may approve an alternative sampling plan if it is demonstrated that expected operating conditions warrant a deviation from the standard sampling plan.
2. D.2.d If two consecutive samples of any one constituent or parameter monitored on a weekly or monthly basis in a 30 day period exceed the effluent limit or are otherwise out of compliance, or if the required sampling frequency is once per month or less and the sample or parameter exceeds the limit or is otherwise out of compliance, the discharger shall implement correction procedures acceptable to or approved by the Board or Executive Officer, on a case by case basis.
3. D.2.e. Within twenty-four (24) hours of receiving the analytic results indicating a violation of any instantaneous maximum limit, a confirmation sample shall be taken with analytic results known within twenty-four (24) hours. In the case that the same instantaneous limit is violated in the second sample, the discharge shall be terminated until the cause of the violation is found and corrected. Alternative methods of verifying and correcting violations of instantaneous maximum limits may be substituted with the approval of the Executive Officer.
4. F.2.a. Total flow shall be recorded continuously.
5. G.4. Written reports as required under G.4. shall be submitted based on a calendar quarter basis, not later than 30 days following the last day of the quarter.
6. G.4.b. The report format shall be in a form acceptable to the Executive Officer of the Regional Board.
7. G.4.e. The report format shall be in a form acceptable to the Executive

Officer of the Regional Board. NPDES Discharge Monitoring Report, EPA Form 3320-1, is provided as guidance.

8. G.5. The annual report shall contain all data required for the fourth quarter in addition to summary data required for annual reporting. This report may be submitted in lieu of the report for the fourth quarter of a calendar year.

I, Steven R. Ritchie, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in the Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in Regional Board Order No. 92-016.
2. Was adopted by the Board on February 19, 1992.
3. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the discharger and revisions will be ordered by the Executive Officer or Regional Board.



STEVEN R. RITCHIE
EXECUTIVE OFFICER

Attachment: Table A

TABLE A
SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS

Sampling Station	I-1	E-1	R-1
TYPE OF SAMPLE	G	G	G
Flow Rate (mgd)		Cont	
BOD, 5-day 20°, or COD (mg/l & kg/day)			
Chlorine Residual & Dosage (mg/l & kg/day)			
Settleable Matter (ml/1-hr. & ft ³ /day)			
Total Suspended Matter (mg/l)			
Total Dissolved Solids	Q	Q	Q
Oil and Grease (mg/l & kg/day)			
Bio-assay 96-hr % survival (flow- through or static)		Y	
Ammonia Nitrogen (mg/l & kg/day)		V	
Turbidity (NTU's)			
pH (units)	M	M	Q
Dissolved Oxygen (mg/l and % saturation)			
Temperature (°C)		M	Q
Apparent Color			
Arsenic (µg/l)		2M/Y	
Cadmium (µg/l)		2M/Y	
Chromium, Total (µg/l)		2M/Y	
Copper (µg/l)		2M/Y	
Cyanide (µg/l)		2M/Y	
Lead (µg/l)		2M/Y	
Mercury (µg/l)		2M/Y	
Nickel (µg/l)		2M/Y	
Selenium (µg/l)		2M/Y	
Silver (µg/l)		2M/Y	
Zinc (µg/l)		2M/Y	

Sampling Station	I-1	E-1	R-1
TYPE OF SAMPLE	G	G	G
EPA 601	Q	M	Q
EPA 602			
EPA 624 ¹	Y	Y	Y
EPA 625 ²	Y	Y	Y
EPA 8015 (Modified TPH and Diesel)	Y	Y	Y

LEGEND FOR TABLE

TYPES OF SAMPLES

G = grab sample
 C-24 = 24 hr. composite
 Cont. = continuous sampling
 DI = depth integrated sample
 BS = bottom sediment sample
 O = observation

TYPES OF STATIONS

I = intake or influent stations
 E = effluent sampling stations
 D = discharge point sampling stations
 R = receiving water sample stations
 L = basin and/or pond levee stations
 B = bottom sediment station
 G = groundwater station

FREQUENCY OF SAMPLING

E = each occurrence
 H = once each hour
 D = once each day
 W = once each week
 M = once each month
 Y = once each year

2/H = twice per hour
 2/W = 2 days per week
 5/W = 5 days per week
 2/M = 2 days per month
 2/y = once in March and once in
 September
 Q = quarterly, once in March, June,
 September, and December

2H = every 2 hours
 2D = every 2 days
 2W = every 2 weeks
 3M = every 3 months
 Cont = continuous

V = varies; analysis for total
 ammonia nitrogen and unionized
 ammonia calculated whenever fish
 bioassay results fail to meet the
 specified percent survival rate

2M/Y = monthly for first 2 months
 yearly thereafter

¹ In lieu of 601 analysis and coincident with 625 analysis

² In lieu of 601 analysis and coincident with 624 analysis